

Vertex Form of Parabolas

key

Name _____

Date _____ Period _____

Use the information provided to write the vertex form equation of each parabola.

1) $y = x^2 + 16x + 71$

$$y = x^2 + 16x + 64 + 71 - 64$$

$$y = (x+8)^2 + 7$$

3) $y = -x^2 - 14x - 59$

$$y = -1(x^2 + 14x + 49) - 59 + 49$$

$$y = -1(x+7)^2 - 10$$

5) $y = x^2 - 12x + 46$

$$y = x^2 - 12x + 36 + 46 - 36$$

$$y = (x-6)^2 + 10$$

7) $y = x^2 - 6x + 5$

$$y = x^2 - 6x + 9 + 5 - 9$$

$$y = (x-3)^2 - 4$$

9) $\frac{1}{2}(y+4) = (x-7)^2$

$$\frac{1}{2}y + 2 = (x-7)^2$$

$$\frac{1}{2}y = (x-7)^2 - 2$$

$$\frac{1}{2}y = (x-7)^2 - 2$$

$$y = 2(x-7)^2 - 4$$

11) $162x + 731 = -y - 9x^2$

$$y = -9x^2 - 162x - 731$$

$$y = -9(x^2 + 18x + 81) - 731 + 729$$

$$y = -9(x+9)^2 - 2$$

13) $y = x^2 + 10x + 33$

$$y = x^2 + 10x + 25 + 33 - 25$$

$$y = (x+5)^2 + 8$$

2) $y = x^2 - 2x - 5$

$$y = x^2 - 2x + 1 - 5 - 1$$

$$y = (x-1)^2 - 6$$

4) $y = 2x^2 + 36x + 170$

$$y = 2(x^2 + 18x + 81) + 170 - 162$$

$$y = 2(x+9)^2 + 10$$

6) $y = x^2 + 4x$

$$y = x^2 + 4x + 4 + 0 - 4$$

$$y = (x+2)^2 - 4$$

8) $y = (x+5)(x+4)$

$$y = x^2 + 9x + 20$$

$$y = x^2 + 9x + \frac{81}{4} + 20 - \frac{81}{4}$$

$$y = (x + \frac{9}{2})^2 - \frac{1}{4}$$

10) $6x^2 + 12x + y + 13 = 0$

$$y = -6x^2 - 12x - 13$$

$$y = -6(x^2 + 2x + 1) - 13 + 6$$

$$y = -6(x+1)^2 - 7$$

12) $x^2 - 12x + y + 40 = 0$

$$y = -x^2 + 12x - 40$$

$$y = -1(x^2 - 12x + 36) - 40 + 36$$

$$y = -1(x-6)^2 - 4$$

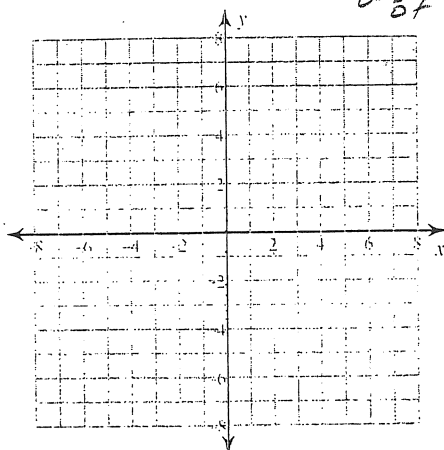
14) $y + 6 = (x+3)^2$

$$y = (x+3)^2 - 6$$

Identify the vertex and axis of symmetry of each. Then sketch the graph.

15) $f(x) = -3(x-2)^2 - 4$

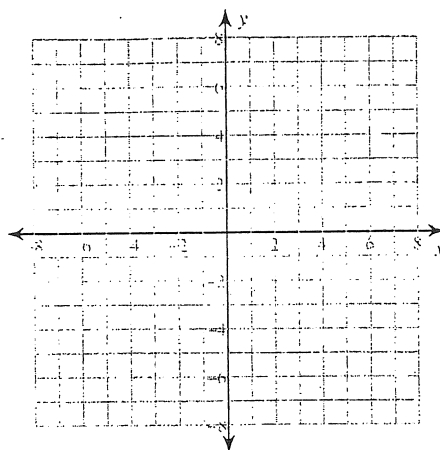
vertex $(2, -4)$
axis of symm
 $x = 2$



- x axis reflection
- vert stretch by a factor of 3
- horiz shift right 2 units
- vert shift down 4 units

16) $f(x) = -\frac{1}{4}(x-1)^2 + 4$

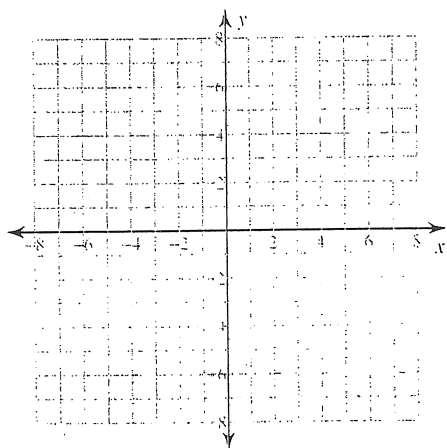
vertex $(1, 4)$
axis of symm
 $x = 1$



- x axis refl
- vertical shrink by a factor of $\frac{1}{4}$
- horiz shift right 1 unit
- vertical shift up 4 units

17) $f(x) = \frac{1}{4}(x+4)^2 + 3$

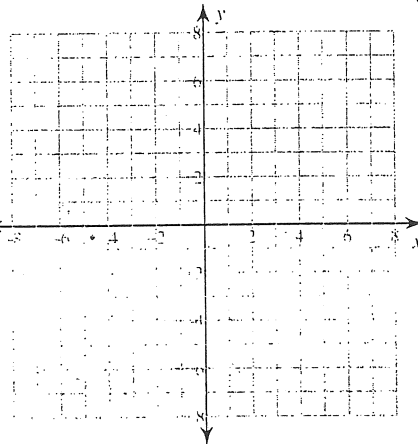
Vertex $(-4, 3)$
axis of symm
 $x = -4$



- vertical shrink by a factor of $\frac{1}{4}$
- horiz shift LEFT 4 units
- vertical shift up 3 units

18) $f(x) = \frac{1}{4}(x+5)^2 + 2$

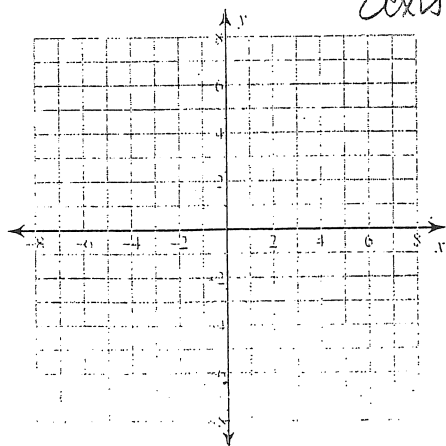
vertex $(-5, 2)$
axis of symm
 $x = -5$



- vert shrink by a factor of $\frac{1}{4}$
- horiz shift LEFT 5 units
- vertical shift up 2 units

19) $f(x) = -2(x+5)^2 - 3$

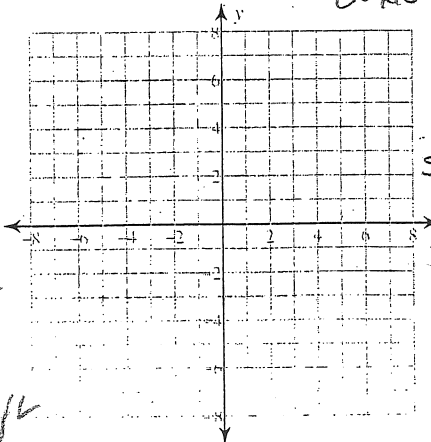
Vertex $(-5, -3)$
axis of symm
 $x = -5$



- x axis refl
- vertical stretch by factor of 2
- horiz shift LEFT 5 units
- vertical shift DOWN 3 units

20) $f(x) = (x+2)^2 - 1$

vertex $(-2, -1)$
axis of symm
 $x = -2$



- no vertical stretch or shrink
- horiz shift LEFT 2 units
- vertical shift down 1 unit